International Survey to assess current practice, opinion and attitudes of nephrologists regarding the definition, diagnosis and classification of chronic kidney disease

Developed and evaluated by the KDIGO CKD Evaluation and Classification working group in 2004: K.-U. Eckardt, R. Walker (co-chairs), R. Burgos-Calderon, G. Eknoyan, A. Levin, J. Rossert, Y. Tsukamoto
There is uniform agreement among members of the Executive Committee and Board of Directors of KDIGO that a common and simple definition and classification of kidney disease is necessary in order to achieve the goals of KDIGO on an international level.

As a preparatory step for a Controversies Conference on this topic, which was held in Amsterdam in November 2004, a survey was developed and disseminated by e-mail to 10,000 nephrologists worldwide to assess their current practice and opinions regarding the definition and classification of CKD and to learn about their experiences in using the definition and classification system developed by KDOQI in 2002.
The survey was web-based and was offered in five different languages (English, French, Spanish, Japanese, German). Several National and International Societies, including the ISN, the ERA-EDTA, the Spanish, the Latin-American and the French Society of Nephrology kindly supported this initiative by providing e-mail addresses of their members.

The results of this survey and many comments provided by the respondents were extremely valuable to the participants of the Controversies Conference and greatly helped to identify issues and areas of agreement, concern and uncertainty. On the other hand we have reasons to believe that, partly due to the consensus reached at the conference, in certain countries (e.g. in Japan) the attitude and opinion of physicians has changed already since the responses to the questionnaire were submitted.
Questions – more specifically

• What is the current practice (eGFR, measurement of proteinuria, definition of CKD, use of a classification system) ?

• Is there agreement on the use of eGFR as a basis of different stages of CKD ?

• Is there agreement on the use of spot urine samples ?

• What is the current knowledge on parameters required for eGFR ?

• What are potential barriers and concerns re the implementation ?
Methodology

- Questionnaire drafted by work-group members, reviewed and amended by KDIGO Board of Directors and other experts

- Preliminary “pilot“ version tested

- Approx. 10,000 nephrologists worldwide asked to complete final web-based version with 25 questions (English, French, Spanish, Japanese, German)

- E-mail addresses kindly provided by ISN, ERA-EDTA, Spanish Society of Nephrology, Latin American Society of Nephrology, French Society of Nephrology
## Response rate

<table>
<thead>
<tr>
<th>Region</th>
<th>Responses</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td>1190</td>
<td>(12 %)</td>
</tr>
<tr>
<td>North America</td>
<td>255</td>
<td>21 %</td>
</tr>
<tr>
<td>Central / South America</td>
<td>83</td>
<td>7 %</td>
</tr>
<tr>
<td>Western Europe</td>
<td>265</td>
<td>31 %</td>
</tr>
<tr>
<td>Eastern Europe</td>
<td>107</td>
<td>9 %</td>
</tr>
<tr>
<td>Middle East</td>
<td>62</td>
<td>5 %</td>
</tr>
<tr>
<td>Africa</td>
<td>37</td>
<td>3 %</td>
</tr>
<tr>
<td>Asia – no Japan</td>
<td>78</td>
<td>7 %</td>
</tr>
<tr>
<td>Japan</td>
<td>141</td>
<td>12 %</td>
</tr>
<tr>
<td>Australia / New Zealand</td>
<td>23</td>
<td>2 %</td>
</tr>
</tbody>
</table>
I. "Some information about you and where you practice nephrology"

1. **Where do you practice nephrology?**
   - university or teaching hospital
   - nephrology unit in another hospital
   - dialysis centre
   - private practice

2. **Age**
   - < 35 yrs
   - 35-50 yrs
   - > 50 yrs

3. **Gender**
   - male
   - female

4. **Country**

   ➔ selection bias (member of large societies, e-mail, senior staff, academic affiliations)
5. In current practice in my professional environment the definition of chronic kidney disease

- is well standardized and does not need to be improved
- is not well standardized, but efforts to improve it will not have a big impact on patient care and outcomes
- is not well standardized and improving it is likely to have a positive impact on patient care and outcomes

→ 44% : no need for change!
II. “Your general view and current practice“

6. *In my opinion a general definition of chronic kidney disease should be based on*

- estimate of GFR
- documentation of proteinuria
- aetiology
- estimate of GFR and documentation of proteinuria
- estimate of GFR and aetiology
- estimate of GFR and documentation of proteinuria and aetiology

7. *In my view a uniform classification system for chronic kidney disease should describe*

- disease severity  
- prognosis for progression
- aetiology
- cardiovascular prognosis

>| yes | no |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>96 %</td>
<td>87 %</td>
</tr>
<tr>
<td>82 %</td>
<td>52 %</td>
</tr>
</tbody>
</table>

> majority votes for complexity ? !
II. “Your general view and current practice”

8. **For the assessment of GFR I currently use…**

<table>
<thead>
<tr>
<th></th>
<th>…in all patients</th>
<th>…in more than 50%</th>
<th>…in less than 50%</th>
<th>…in no patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>serum creatinine only</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>estimated GFR from serum creatinine</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>measured creatinine clearance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>other clearance technique</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
8. For the assessment of GFR I currently use...

<table>
<thead>
<tr>
<th>Method</th>
<th>...in all patients</th>
<th>...in more than 50%</th>
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</tr>
</thead>
<tbody>
<tr>
<td>serum creatinine only</td>
<td></td>
<td></td>
<td>24 %</td>
<td>27 %</td>
</tr>
<tr>
<td>estimated GFR from serum creatinine</td>
<td>40 %</td>
<td>30 %</td>
<td>24 %</td>
<td>6 %</td>
</tr>
<tr>
<td>measured creatinine clearance</td>
<td>16 %</td>
<td>28 %</td>
<td>44 %</td>
<td>13 %</td>
</tr>
<tr>
<td>other clearance technique</td>
<td>2 %</td>
<td>5 %</td>
<td>32 %</td>
<td>61 %</td>
</tr>
</tbody>
</table>

→ eGFR far more frequently used than Crea Clearance!
9. Serum creatinine levels that I order in my practice are measured by

- the Jaffe-reaction 30%
- an enzymatic method 35%
- I do not know 35%

→ variability and uncertainty
10. For the assessment of proteinuria I currently use...

<table>
<thead>
<tr>
<th>Test Description</th>
<th>... in all patients</th>
<th>... in more than 50%</th>
<th>... in less than 50%</th>
<th>... in no patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>dip sticks</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>dip sticks to detect microalbuminuria</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>quantitative albumin assay</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>quantitative total protein assay</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>spot samples</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>timed collections (e.g. 24 hour)</td>
<td></td>
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<tr>
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<tr>
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<td>11 %</td>
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<td>dip sticks to detect microalbumin</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>quantitative albumin assay</td>
<td>13 %</td>
<td>19 %</td>
<td>43 %</td>
<td>26 %</td>
</tr>
<tr>
<td>quantitative protein assay</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>spot samples</td>
<td>23 %</td>
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<td>31 %</td>
<td>23 %</td>
</tr>
<tr>
<td>timed collections (e.g. 24 hour)</td>
<td>27 %</td>
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<td>36 %</td>
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above average in W Europe (except UK), Africa and Middle East

more “popular“ in Japan, where only 9% never used them as compared to > 40 % who never used them in other regions
## 11. “Your general view and current practice”

### 10. For the assessment of proteinuria I currently use...

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<td>51 %</td>
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<td>20 %</td>
</tr>
</tbody>
</table>

→ more than 20% of nephrologists never use spot-samples, whereas only 5% never use timed collections
II. “Your general view and current practice“

11. *In order to describe the status of patients with long standing reduction of GFR of less than 60 ml/min/1.73 m\(^2\), but not on dialysis, I use the following terms*

<table>
<thead>
<tr>
<th>Condition</th>
<th>...in all patients</th>
<th>... in more than 50%</th>
<th>... in less than 50%</th>
<th>... no patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>chronic renal failure</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>predialysis</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>chronic renal insufficiency / impairment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>chronic kidney disease</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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11. *In order to describe the status of patients with long standing reduction of GFR of less than 60 ml/min/1.73 m$^2$, but not on dialysis, I use the following terms*

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<thead>
<tr>
<th></th>
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</tr>
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<tr>
<td>chronic renal failure</td>
<td>23 %</td>
<td>20 %</td>
<td>22 %</td>
<td>35 %</td>
</tr>
<tr>
<td>predialysis</td>
<td>7 %</td>
<td>6 %</td>
<td>37 %</td>
<td>50 %</td>
</tr>
<tr>
<td>chronic renal insufficiency / impairment</td>
<td>31 %</td>
<td>22 %</td>
<td>20 %</td>
<td>20 %</td>
</tr>
<tr>
<td>chronic kidney disease</td>
<td>35 %</td>
<td>16 %</td>
<td>19 %</td>
<td>24 %</td>
</tr>
</tbody>
</table>

⇒ *not very clear tendencies*
11a. Do you see a difference in these terms for medical communication, patient education or public awareness

- No: 15%
- Yes: 85%

→ We do not speak a common language
III. “Your recommendations“

12. In my opinion for the detection of kidney disease assessment of GFR should be based on

- serum creatinine in all patients
- eGFR in all patients
- serum creatinine in all patients and eGFR in selected cases
- serum creatinine in all patients and GFR (using creatinine clearance or other techniques) in selected cases
- measurement of GFR (using creatinine clearance or other techniques) in all patients

> 50% in North America, Australia, New Zealand and UK

more than 50% use eGFRs, but 30% prefer a combination of serum-creatinine and clearance measurements
III. “Your recommendations“

13. In my opinion monitoring the loss of kidney function in patients with chronic kidney disease should be based on

- serum creatinine in all patients
- eGFR in all patients
- serum creatinine in all patients and eGFR in selected cases
- serum creatinine in all patients and GFR (using creatinine clearance or other techniques) in selected cases
- measurement of GFR (using creatinine clearance or other techniques) in all patients

\[ \rightarrow \text{not much difference between detection and monitoring} \]
14. To what level of accuracy should GFR be estimated from equations in clinical practice?

- +/- 10%: 60%
- +/- 20%: 33%
- +/- 30%: 3.4%
- +/- 40%: 0.9%
- +/- 50%: 2.9%

Highest expectations:
- Africa: 76%
- Japan: 53%

Lowest expectations:
- Africa: 16%
- Japan: 43%
15. For the two different formulas to estimate the GFR from serum creatinine the following parameters are required:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Cockcroft-Gault formula</th>
<th>Abbreviated MDRD formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serum creatinine</td>
<td>(140 – age) x bw S-crea x 72 x 0.85 for female</td>
<td>186 x S-crea (-1.154) x age (-0.203)</td>
</tr>
<tr>
<td>Serum urea</td>
<td></td>
<td>x 0.19 if African-American x 0.74 if female</td>
</tr>
<tr>
<td>Age</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Sex</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Body weight</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
15. *For the two different formulas to estimate the GFR from serum creatinine the following parameters are required*

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Cockcroft-Gault formula</th>
<th>abbreviated MDRD formula</th>
<th>Correct answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>serum creatinine</td>
<td>X</td>
<td>X</td>
<td>63.4 %</td>
</tr>
<tr>
<td>serum urea</td>
<td></td>
<td></td>
<td>67.3 %</td>
</tr>
<tr>
<td>age</td>
<td>X</td>
<td>X</td>
<td>58.6 %</td>
</tr>
<tr>
<td>sex</td>
<td>X</td>
<td>X</td>
<td>53.8 %</td>
</tr>
<tr>
<td>body weight</td>
<td>X</td>
<td></td>
<td>62.4 %</td>
</tr>
<tr>
<td>ethnicity</td>
<td></td>
<td>X</td>
<td>52.0%</td>
</tr>
</tbody>
</table>
15. For the two different formulas to estimate the GFR from serum creatinine the following parameters are required
16. I personally prefer to use the following formula for estimation of GFR

- Cockroft-Gault: 67%
- abbreviated MDRD: 22%
- other: 11%
16. *I personally prefer to use the following formula for estimation of GFR*

- North America (255)
- South / Central Amer. / Carribean (83)
- Western Europe – no UK (365)
- UK (39)
- Eastern Europe (107)
- Asia – no Japan (78)
- Japan (143)
- Australia / New Zealand (23)
- Middle East (62)
- Africa (37)
IV. “Comment on different aspects of estimated GFR”

17. *In my view the GFR estimated from serum creatinine in daily practice is*

- of less value than the measurement of creatinine clearance
- of similar value to a measurement of creatinine clearance
- better than the measurement of creatinine clearance

> 40% in Japan and Middle East

> 40% in North America, Australia, New Zealand and UK

→ mixed opinions
18. The routine reporting of estimated GFR from serum creatinine by clinical chemistry laboratories

- is unnecessary: 9.7%
- is desirable, but not feasible: 16%
- is desirable and feasible: 50%
- is already implemented in my professional environment:
  - Cockroft-Gault: 21.6%
  - abbreviated MDRD: 6.8%
  - other: 2.9%

40% in W Europe (except UK)
< 10% in Australia, New Zealand, Japan
19. If in your view the routine reporting of estimated GFR from serum creatinine is desirable, what do you consider to be the main problem for implementation

- technical barriers
- lack of co-operation with clinical chemist
- resistance of physicians to use a “new” parameter
- all of the above
- I would not expect major difficulties

→ 50% envisage different hurdles
20. **If routine reporting of estimated GFR would be implemented, what consequences would you predict for nephrology practice**

- no significant consequences
  - 7.6%

- fewer referrals, because non-nephrologists then obtain information on GFR
  - 6.7%

- more referrals and I would consider this as an improvement
  - 66%

- more referrals, but I would consider this as a problem, because nephrology resources would not be sufficient to deal with the increased workload
  - 20%

Australia, New Zealand (48%)
UK (59%)
V. “Comment on measurement of proteinuria“

21. The measurement of protein related to creatinine in a spot urine sample is

- a very inaccurate method, that does not reveal comparable results with 24 hour urine collection
- a useful screening test for proteinuria, which however requires confirmation by 24 hour urine collection
- a method which is sufficient to identify individuals with pathological proteinuria but is not sufficient for monitoring the course of proteinuria
- a method which makes 24 hour urine collection unnecessary in most patients

→ 60% believe it is not as good as timed collections
VI. “Comment on the K-DOQI classification system of the stages of kidney disease “

22. Consider the definition and classification of stages of kidney disease, as developed by the National Kidney Foundation in the USA

- in my opinion this system is not helpful (8%)
- in my opinion this system could be helpful, but I would prefer that it is modified (20%)
- in my opinion this system can be used as it is and should be introduced and widely used as soon as possible (72%)

→ high agreement, despite concerns about different components that were expressed in previous answers
VI. “Comment on the K-DOQI classification system of the stages of kidney disease “

23. Please indicate the limitations of the system and how you would suggest to modify it

Very helpful comments - four main categories:

1. Stages unclear/need to be altered
2. Something is missing from system
3. Problem with definitions
4. Problem with the way things are measured or done in reality
5. Problem with classification systems in general

Details to be discussed in workgroup sessions
VI. “Comment on the K-DOQI classification system of the stages of kidney disease“

24. Is this system currently being used in your professional environment?

- almost never 13%
- rarely 32%
- usually 55%

→ the glass is more half full than half empty
25. Please indicate your view about the above classification system in conjunction with routine reporting of calculated GFR.

The automatic reporting of GFR and the classification system

- would be helpful in identifying individuals with kidney function abnormalities
  - 81%

- would be misleading and lead to un-necessary referrals to nephrologists
  - 4.7%

- is not sufficiently validated to warrant its use in general clinical practice
  - 14%
Summary and conclusions

Definition and Classification of Kidney Disease
• KDOQI system rather frequently used already (24);
• vast majority believes that it helps in identifying individuals with kidney function abnormalities (25), but
• almost 30% find it not useful or would prefer modification (22);
• many request additional information (aetiology, renal and CV prognosis) (6,7);
• inconsistent terminology (11)

Assessment of GFR
• eGFR already frequently used (8), but
• majority feel that it should not be used alone for detection and follow-up (12, 13);
• one third consider it of less value than creatinine clearance (17);
• routine reporting implemented in 25%, but almost 50% envisage problems;
• general believe that routine reporting leads to more referrals (25);
• preference for Cockcroft-Gault as compared to MDRD (16);
• uncertainty about methodology (9, 15)

Assessment of proteinuria
• search for microalbuminuria possibly neglected (10);
• total protein assays more frequently used than albumin assays (10);
• spot samples less frequently used than timed collections (10), and only one third believe that they make timed collections unnecessary (21)
The work group members express their sincere thanks to those colleagues in all parts of the world who took their time to support the KDIGO process by replying to the questionnaire.